



USMC Active and Reserve Force Structure and Mix Study

Volume III: Development of Alternative Structures and Estimates of Training Times

William H. Sims

DTIC
ELECTE
FEB 23 1993
S E D

50 Years
CNA 1992

DISTRIBUTION STATEMENT
Approved for public release
Distribution Unlimited

CENTER FOR NAVAL ANALYSES

4401 Ford Avenue • Post Office Box 16268 • Alexandria, Virginia 22302-0268

93-03626



40p8

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED.

Work conducted under contract N00014-91-C-0002.

This Research Memorandum represents the best opinion of CNA at the time of issue.
It does not necessarily represent the opinion of the Department of the Navy.

REPORT DOCUMENTATION PAGE

Form Approved
OPM No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources gathering and maintaining the data needed, and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503.

1. AGENCY USE ONLY (Leave Blank)		2. REPORT DATE December 1992	3. REPORT TYPE AND DATES COVERED Final	
4. TITLE AND SUBTITLE USMC Active and Reserve Force Structure and Mix Study - Volume III: Development of Alternative Structures and Estimates of Training Times			5. FUNDING NUMBERS C - N00014-91-C-0002 PE - 65154N PR - R0148	
6. AUTHOR(S) William H. Sims				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Center for Naval Analyses 4401 Ford Avenue Alexandria, Virginia 22302-0268			8. PERFORMING ORGANIZATION REPORT NUMBER CRM 92-185	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)			10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION/AVAILABILITY STATEMENT Cleared for Public Release; Distribution Unlimited			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) This research memorandum is the third in a set of five volumes addressing the Marine Corps active and reserve force structure and mix study. In this volume, we develop an inclusive set of options that are analyzed in detail in volume IV. We also make detailed estimates of the post-mobilization training time needed by reserve units.				
14. SUBJECT TERMS Active duty, Combat readiness, Manpower utilization, Marine Corps personnel, Marine Corps planning, Marine Corps training, Military force levels, Military reserves, Mobilization, Policies, SMCR (selected Marine Corps reserves), Time			15. NUMBER OF PAGES 41	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT CPR	18. SECURITY CLASSIFICATION OF THIS PAGE CPR	19. SECURITY CLASSIFICATION OF ABSTRACT CPR	20. LIMITATION OF ABSTRACT SAR	

USMC Active and Reserve Force Structure and Mix Study

Volume III: Development of Alternative
Structures and Estimates of Training Times

William H. Sims

Office of the President

Accession For	
NTIS	CRA&I <input checked="" type="checkbox"/>
DTIC	TAB <input type="checkbox"/>
Unannounced <input type="checkbox"/>	
Justification	
By	
Distribution /	
Availability Codes	
Dist	Avail and / or Special
A-1	

DTIC QUALITY INSPECTED 3

50 Years
CNA 1992

CENTER FOR NAVAL ANALYSES

4401 Ford Avenue • Post Office Box 16268 • Alexandria, Virginia 22302-0268

ABSTRACT

This research memorandum is the third in a set of five volumes addressing Marine Corps active and reserve force structure and mix. In this volume, we develop an inclusive set of options that are analyzed in detail in volume IV. We also make detailed estimates of the post-mobilization training time needed by reserve units.

CONTENTS

	Page
Introduction.....	1
Background.....	1
Structure and Mission.....	1
Historical Force Size.....	2
Preparing Reserve Forces for War.....	4
Comparative Readiness of SMCR and Active-Duty Units.....	4
Post-Mobilization Training Needed by SMCR.....	5
Alternative Force Structures	14
References	19
Appendix A: Historical Data	A-1 - A-4
Reference	A-5
Appendix B: Career Field-Training Days	B-1 - B-7

ILLUSTRATIONS

	Page
1 USMC Active and Reserve Forces: 1940-1990	3
2 Marine Corps Reserves, Active Duty and Non-Active Duty: 1946-1990	3
3 Comparison of Post Recruit-Training Career Field-Training Days for SMCR and Active-Duty Units Beginning Pre- Deployment Workup	11
4 USMC Total-Force Structure Paradigm	15
5 USMC Total-Force Structure Options	16

TABLES

	Page
1 Comparison of MCCRES Scores for SMCR and Active-Duty USMC Units	5
2 Estimates of Post-Mobilization Training Needed by SMCR Based on Informed Military Judgment	6
3 Estimates of Post-Mobilization Training Time Needed by SMCR From 1992 Survey of SMCR Units	7
4 Comparison of Annual Field-Training Days: Active and SMCR Ground Combat Units	8
5 Comparison of Flight Time per Flight Crew for Active and SMCR Units	9
6 Post-Mobilization Training Opportunity for Selected SMCR Battalions During Desert Storm	10
7 Comparison of Experience Mix of SMCR and Active Units Beginning Predeployment Workup	11
8 Mean Field-Training Days by Months Before Deployment	12
9 SORTS Categories for Training Categories	13
10 Estimates of Post-Mobilization Training Needed by SMCR	13
11 USMC Alternative Force Structures	17

INTRODUCTION

This research memorandum is the third in a set of five volumes on Marine Corps active and reserve force structure and mix. Congress mandated that the Secretary of Defense assess a wide range of alternative force structures capable of carrying out the projected missions for the mid to late 1990s. The assessment is to consist of two parts. The first part is to be conducted by a "federally funded research and development center that is independent of the military departments." The second part of the study is to be conducted by the Secretary of Defense and Chairman of the Joint Chiefs of Staff (JCS). RAND is the prime contractor for the first part of the study. CNA was contracted separately to assess the Navy and Marine Corps forces (for a summary of the study objectives, see [1]). This volume addresses two distinct parts of the study: the preparation of reserve forces for war and the development of a wide range of alternative force structures. We analyze the effect of training time on these alternative force structures in volume IV [2].

Before addressing these tasks, we provide a brief background section to help put the subsequent discussion in context. That section addresses the legislated structure and mission of the Marine Corps and historical force size since World War II. This period covers both the massive demobilization after World War II and the subsequent buildup during the Cold War.

The subsequent section discusses the relative readiness of active and reserve units and develops estimates of the post-mobilization training reserve units need. We develop a wide range of alternative force structures in the final section. The alternatives developed in this volume are intended to be comprehensive; the less promising ones are eliminated in volume IV.

BACKGROUND

Marine Corps Structure and Mission

Title 10 of the U.S. Code [3] stipulates that the Marine Corps will consist of not less than three divisions and three wings plus organic support forces. This reference also delineates the missions of the Marine Corps to be the following:

- Provide Fleet Marine Forces (FMF) for service with the fleet in seizure or defense of advanced naval bases and conduct of such land operations as may be essential to the prosecution of a naval campaign.
- Provide detachments for service on armed vessels of the Navy.
- Provide security detachments for naval stations and bases.

- Perform other duties as the President may direct (but these duties are not to interfere with the primary duty for which the Marine Corps was organized).
- Develop doctrine for amphibious operations.
- Expand peacetime components to meet the needs of war.

Historical Force Size

How large the force should be is a fundamental part of the force structure issue. One point of reference is how large it has been in the past. Appendix A contains tables of the data used in this section.

Figure 1, based on data from [4], shows the size of the Marine Corps active force since 1940 and compares it with the number of reserves not on active duty. The number of active-duty Marines rose from about 20,000 before World War II to a peak of about 500,000 in 1944. After the war, the number quickly fell, reaching a level of about 75,000 by 1950. By this time, the number of reservists had grown to about 129,000. With the outbreak of the Korean War, about two-thirds of the reserves were mobilized. This reserve mobilization and the new enlistments eventually increased the active-duty force to about 240,000. After the Korean War, active-duty strength declined to about 200,000,¹ where it has remained except during the Vietnam War.

Reserve strength began to grow with the advent of compulsory reserve service mandated by the Armed Forces Reserve Act of 1952. Typically it reaches a peak several years after the active-duty strength peaks and then declines as reserve obligations are completed.

Figure 2 shows how many reservists were and were not on active duty since 1946. The figure shows the reserve mobilization for the Korean War and some residual participation during the late 1950s. A small number of reservists also participated, presumably voluntarily, in the Vietnam War. About 30,000 reservists took part in the recent Gulf War.² On balance, the reserves have been a large, but rarely used, component of the total force.

1. Considering both FMF and non-FMF components, a force of this size provides about three Marine expeditionary forces (MEFs).

2. Figures 1 and 2 reflect end-of-fiscal-year numbers and do not capture most of the buildup for the Gulf War.

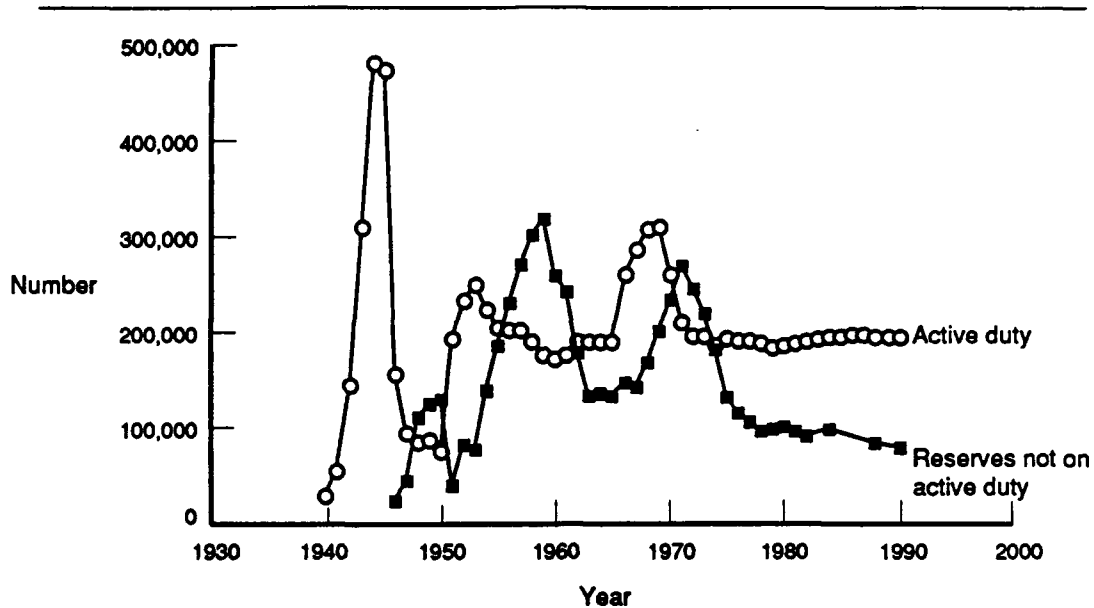


Figure 1. Marine Corps and reserve forces: 1940-1990

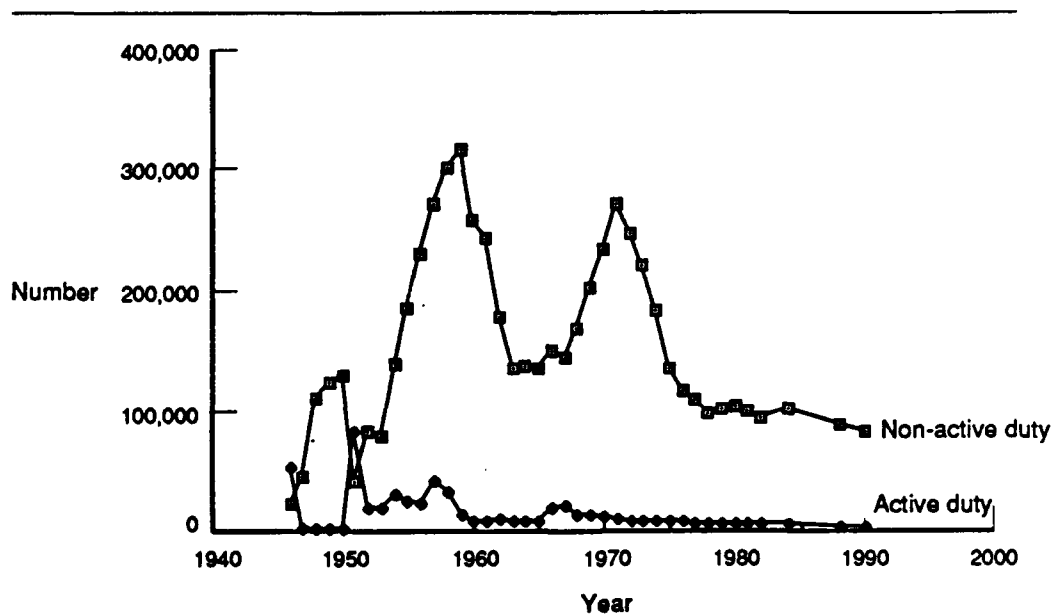


Figure 2. Marine Corps reserves, active duty and non-active duty: 1946-1990

PREPARING RESERVE FORCES FOR WAR

The Marine Corps Ready Reserve consists of the Individual Ready Reserve (IRR) and the Selected Marine Corps Reserve (SMCR). The IRRs are not required to participate in training and, in the event of a crisis, would be used as fillers in units. Conversely, most of the SMCR is organized into units¹ and trains on a regular basis. For this reason, the SMCR will be the focus of the discussion here.

In this section, we discuss two major issues that may influence force structure and mix decisions:

- Comparative readiness of SMCR and active-duty units
- Post-mobilization training needed by SMCR.

Comparative Readiness of SMCR and Active-Duty Units

Force readiness is a critical issue. If units are not ready when they are needed, they are of little value. In the following paragraphs, we compare the readiness of SMCR and active-duty units.

It is reasonable to expect that SMCR units are not as ready as active-duty units. The expected differences follow from the reduced amount of training time available to reserves. SMCR units get only about one weekend of drill time per month and two weeks of annual training duty (ATD) per year.

The differences in training time are reflected in performance differences on the Marine Corps Combat Readiness Evaluation System (MCCRES) evaluations. MCCRES scores are based on hands-on demonstrations of unit capability in meeting performance standards in a wide variety of critical combat tasks. Both active-duty and SMCR units are held to the same MCCRES standards. Table 1 compares MCCRES results [5] from the most recent evaluations of active and SMCR units. The data indicate that SMCR infantry and artillery units are less capable than their active-duty counterparts. Aviation units appear to be comparable. Overall, we can see that differences exist, but we cannot attach meaning to the magnitude of the differences.

Another measure of readiness on which the SMCR and active-duty units can be compared is the Status of Resources and Training System (SORTS). SORTS [6] tabulates the readiness of units at the battalion level based on commanders' reports of unit status.

1. The SMCR also includes individual mobilization augmentees who fill billets in active units during war time.

Table 1. Comparison of MCCRES scores for SMCR and active-duty units

Type of unit	Average MCCRES score	
	Active duty	SMCR
Infantry	90	86
Artillery	94	88
Aviation	96	96

Volume V [7] provides a classified comparison of SMCR and active-duty units. In it, we conclude that there is a quantitative difference in the readiness of the SMCR and active-duty units. The SMCR would clearly require more post-mobilization training than active-duty units. Given uncertainties about the objectivity of commanders' inputs to SORTS we cannot make any firm conclusion about the exact magnitude of the difference.

Post-Mobilization Training Needed by SMCR

By far the most important issue is the amount of post-mobilization training that the SMCR requires. If little or no post-mobilization training is needed, a force with a smaller active component could respond to contingencies. Conversely, if the SMCR requires extensive post-mobilization training, larger active forces may be needed to meet realistic force-arrival time lines.

The issue of how much training is enough is probably impossible to address definitively. It depends on the threat to be faced and therefore will vary from situation to situation. Even active-duty units are not fully trained for every possible situation, and there is always more training that could be done. Given the evident uncertainties, we believe that the question can best be phrased as "how much post-mobilization training will the unit need to be as ready as active-duty Marines?"

We use the following sources to develop estimates of the post-mobilization training time needed by the SMCR:

- Informed military judgment
- A survey of SMCR commanders
- The annual deficit in field-training days

- The amount of post-mobilization training for Desert Storm
- The amount of pre-deployment workup time for active units
- Official estimates of post-mobilization training needed.

We discuss each of these sources in some detail below.

Informed Military Judgement

During the course of the analysis, we asked a large number of active-duty and reserve Marines about the post-mobilization training needed by the SMCR. We talked with a senior Desert Storm commander who also had previous experience as commander of the SMCR division. We either spoke with battalion and company commanders and with officers charged with training SMCR units during the recent mobilization or we read their after-action reports and lessons-learned commentaries. We received a range of opinions. There were, of course, some extreme positions--such as reservists who claimed that the SMCR was ready to go with no training, and active-duty Marines who believed that the SMCR needed to be totally retrained.

Once we disregarded these obvious outliers, a consensus estimate emerged that was closely aligned with that of the senior commander. The prevailing view is that the amount of post-mobilization training needed by the SMCR varies greatly with the size of the reserve unit that is to be integrated into the combat force. The estimated time, shown in table 2, ranges from 30 days for SMCR units employed as reserve companies to between 90 and 120 days for those employed as reserve regiments.

Table 2. Estimates of post-mobilization training needed by SMCR based on informed military judgment

Element ^a	Training needed (days)
Company	30
Battalion	60-90
Regiment	90-120

a. Ground combat units.

Survey of SMCR Commanders

The second estimate comes from a survey [8] of SMCR commanders. This survey, which was conducted by the Commanding General, Marine Reserve Forces, in March 1992, asked the question "How long will it take your unit to prepare for employment in a war zone?" Table 3 summarizes the responses for the ground combat element (GCE) and other major types of units. The data indicate that tank and amphibious assault vehicle (AAV) companies would need an average of 24 days. Independent battalions, such as light armored infantry (LAI), would need about 69 days and infantry regiments would require about 26 days. The combat service support element (CSSE) would need about 30 days and the surveillance, reconnaissance, and intelligence group (SRIG) would require about 35 days. The estimate for a Marine expeditionary brigade (MEB) was 60 days. With the exception of the 26-day estimate for infantry regiments, the estimates appear to be internally consistent. Given the complexities of regimental operations, the 26-day estimate probably is unrealistic.

Table 3. Estimates of post-mobilization training time needed by SMCR from 1992 survey of SMCR units

Type of unit	Time (days)					
	Company	Battalion	Regiment	CSSE	SRIG	Other
GCE						
Infantry unit A			15			
Infantry unit B			28-35			
Infantry unit C			30			
Recon. Bn		42-56				
Tanks unit A	30	60				
Tanks unit B		53				
AAV	14-21	60				
LAI		14				
Combat Engr.		180				
CSSE				30		
SRIG						
Force Recon. A					60-90	
Force Recon. B					30	
ANGLICO A					14	
ANGLICO B					42	
Comm. Bn					39-46	
Civil Affairs					8-9	
MEB						
Average	24	69	26	30	35	60

NOTE: AAV = amphibious assault vehicle, LAI = light armored vehicle, and ANGLICO = Air Naval Gunfire Liaison Company

Annual Deficit in Source Field-Training Days

A third estimate comes from the annual SMCR field-training deficit, (i.e., how many fewer days of field training typical SMCR units get per year). Table 4 compares the days spent in field training each year by SMCR and active-duty ground combat units. The data indicate that active-duty ground combat units spend from 90 to 133 days in field training each year. In contrast, SMCR units spend from 26 to 41 days in similar activity. Thus, the annual SMCR training deficit ranges from 62 to 107 days.

Table 4. Comparison of annual field-training days: Active and SMCR ground combat units

Type of unit	Average annual field training days ^a		
	Active ^b	SMCR ^c	SMCR deficit
Infantry	133	32	101
Tanks	133	26	107
AAV	90	28	62
Artillery	104	37	67
Engineers	111	28	83
Reconnaissance	104	38	66
LAV	126	41	85
Average	114	33	82

a. MCTEC (Code TE-33).

b. Actual time for FYs 1987, 1988, and 1989.

c. Actual time for FYs 1987 and 1989.

Table 5 presents a similar comparison for SMCR and active-duty aviation units. The data indicate that active-duty flight crews receive about 264 flight hours per year compared to the 120 received by SMCR crews. This difference may be expressed as an annual SMCR deficit of 24 training days. Some have argued that part of this deficit may be covered by those SMCR Marines who are commercial airline pilots. There are profound differences, however, between flying commercial aircraft and flying combat missions. Thus, we believe that a training deficit on the order of 24 days is realistic.

Table 5. Comparison of annual flight time per flight crew for active and SMCR units

Category	Active (hr)	SMCR (hr)	SMCR deficit	
			(hr)	(days) ^a
Budgeted	264 ^b	110 ^b	154	26
Actual	264 ^c	120 ^d	144	24

a. Assumes maximum training rate of six flight hours per day.

b. DC/S Aviation, FY 1992.

c. DC/S Aviation, Code APP-2B, FY 1987 - FY 1991.

d. HQ 4th MAW, estimate by LtCol M. Davis, July 1992.

SMCR Post-Mobilization Training for Desert Storm

Another benchmark for training time estimates is the time SMCR units had to prepare for combat in Operation Desert Storm. Although we cannot be certain that all of the available time was actually used for training, the interval serves as an upper bound.

Marines in SMCR units were used in various ways during Operation Desert Storm. Some were used as small detachments; some were activated as complete units and assigned rear-area duty; and others were activated as complete units and assigned to the front as attack units. We focus on the training time available to this last group of Marines because they could be considered ready for any task. Other units and individuals appear to have had a minimum of 33 days of training.

Table 6 shows the post-mobilization training opportunity for those SMCR units directly involved in combat or having other highly demanding assignments. Both Third Battalion, 23d Marines (an infantry battalion), and Eighth Tank Battalion (8th Tanks) played a direct role in the attack as front-line units. As shown in table 6, we estimate that Third Battalion, 23d Marines, had 86 days available for post-mobilization training. 8th Tanks declared itself ready after about 48 days of training, but had a total of 85 days before the actual attack was carried out. By all accounts, these two units performed satisfactorily and therefore we assumed that the available days of training were enough.

Second Battalion, 23d Marines, did not participate in Operation Desert Storm but was sent to Okinawa to fill a Unit Deployment Program (UDP) role. On 1 March 1991, after about 76 days of training, Second Battalion, 23d Marines, was designated as the Alert Marine air-ground-task force (MAGTF). As such, it was first in line for any combat

mission that might have arisen, and therefore we believe it was fully trained in the 76 days.

Table 6. Post-mobilization training opportunity for selected SMCR battalions during Desert Storm

Unit	Activity	Date ^a activated	Date ^a ready	Days available	
				Total	Training ^b
3/23	ODS attack	25 Nov	24 Feb	91	86
8th Tanks	ODS attack	26 Nov	17 Feb ^c	53-90	48-85
2/23	UDP alert MAGTF	9 Dec	1 Mar	81	76

- a. Unit chronologies: Archive section, Marine Corps Historical Branch, Washington Navy Yard.
- b. Total interval, less 5 days for air transit (includes both preparation and travel time).
- c. Unit declared itself ready on 17 February 1991, but the attack did not come until 24 February 1991.

Predeployment Workup Times

Another approach to estimating SMCR post-mobilization training time is to identify active Marine Corps units with experience levels similar to SMCR units and estimate how much additional training the active units were given before they were considered combat ready. By inference, that amount of additional training should be a good estimate of the post-mobilization training needed for SMCR units. We focused on field training (instead of classroom training) because it is considered the most critical type of training and the training least likely to be available to reserve units.

Combat-ready active-duty units routinely deploy afloat for six-month periods as Marine expeditionary units (MEUs) or to forward bases in Okinawa as part of the UDP. Each active-duty unit includes experienced and inexperienced personnel. As shown in table 7, only about 30 percent of the personnel have been on a deployment before. Before deploying, these units go through a workup period for about six months during which new personnel are trained and experienced personnel refresh their skills.

SMCR units are also a mixture of experienced and inexperienced personnel. As shown in table 7, prior-service personnel make up about 40 percent of the total. About half of the prior-service personnel have prior active service and half have prior reserve service [9].

Table 7. Comparison of experience mix of SMCR and active units beginning predeployment workup

Experience level	Active duty ^a		SMCR ^b	
	Category	Percent	Category	Percent
High	Prior deployment	30	Prior service	40
Low	Non-prior deployment	70	Non-prior service	60
		<u>100</u>		<u>100</u>

a. Representative MEU/UDP infantry battalions circa 1988.

b. Headquarters, Marine Corps, August 1992.

Appendix B develops the estimates of the career field experience of the SMCR and active-duty units. Figure 3 also shows these estimates. The data indicate that the career experience level in the SMCR is similar to that of an active-duty unit just beginning predeployment workup. We can therefore use the deployment workup time of an active-duty unit as a proxy for the post-mobilization training needed by an SMCR unit.

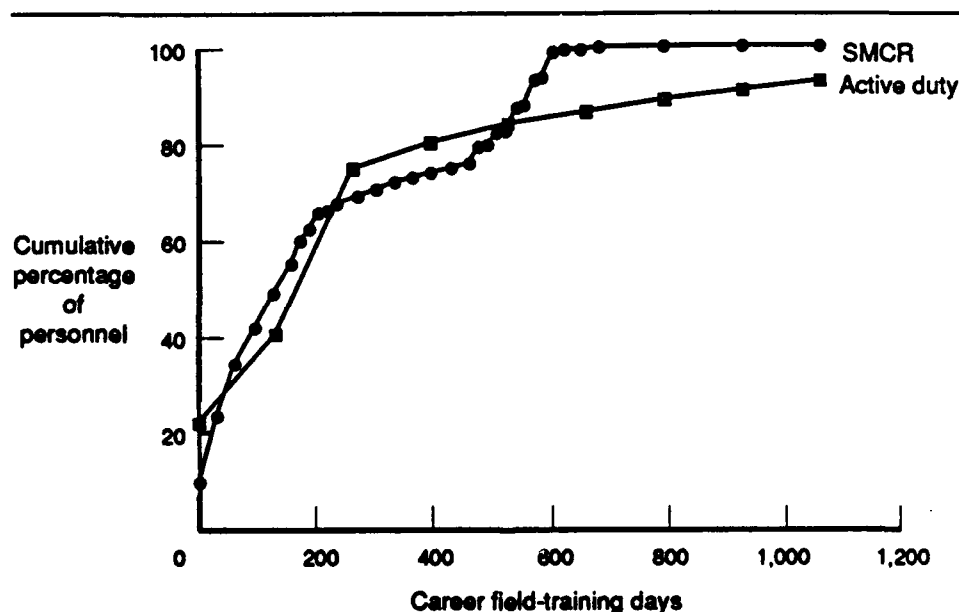


Figure 3. Comparison of post-recruit-training career field-training days for SMCR and active-duty units beginning pre-deployment workup

Table 8 shows the amount of field training received by typical infantry battalions in the six months before deployment. These data were chosen from a period before Operation Desert Storm because the Gulf War severely disrupted training patterns. The data indicate that similar amounts of field training were reported by MEUs and UDP units during workup. The field training starts out at a fairly high level of about 11 days per month and falls off to about 3 days per month just before deployment. The lower rate just before deployment is partly due to the need to prepare equipment for deployment. It also may be due to the nature of the data-reporting system, which excludes time spent on amphibious shipping--time which is often clustered just before a deployment. Nonetheless, a typical workup for a battalion apparently involves about 60 days of field training. Training plans indicate that about half of that time (30 days) is spent on company-level training.

Table 8. Mean field-training days by months before deployment

Months before deployment	Field-training days per month ^a		
	MEUs	UDPs	Average
1	1.9	3.7	2.8
2	6.7	5.5	6.1
3	14.8	14.1	14.5
4	11.4	15.1	13.1
5	12.4	11.7	12.1
6	<u>13.6</u>	<u>8.8</u>	<u>11.2</u>
Total	60.8	58.9	59.8

a. Average of 12 infantry battalions circa 1988.

Official Estimates of Post-Mobilization Training Needed

The last source of training time estimates we will discuss is official data from the SORTS database described earlier. For each battalion, SORTS reports a training status according to the scheme outlined in table 9. Because the SORTS data are classified, the reader is referred to [7] for details. At an unclassified level, less than 42 days of training are needed. In our judgment, the SORTS estimates are somewhat optimistic.

Table 9. SORTS categories for training readiness

SORTS category	Days of training required
C-1	≤ 14
C-2	15 ≤ 28
C-3	29 ≤ 42
C-4	> 42

Table 10 summarizes all of the training time estimates by source. With the exception of training times for regiments, the estimates generally are consistent. The 26-day estimate for infantry regiments from the SMCR survey is not consistent with the 90 to 120 days estimated by informed military judgement nor is it internally consistent with the 69 days estimated in the SMCR survey for independent battalions. Thus, we considered it to be unrealistic. The final column in table 10 gives our best estimate (not an average of estimates) of the SMCR post-mobilization training times. For the GCE, we estimate that companies need 30 days, battalions need 60 to 70 days, and regiments need 90 to 120 days. Estimates for the CSSE, ACE, and SRIG are all 30 days. Although the Marine Corps has never employed a full reserve MEF, we allowed the possibility to evaluate the widest range of alternative force structures. Subject to large uncertainties, we estimate that the training time for a MEF would be at least as long as the maximum 120 days for a regiment but not more than 180 days.

Table 10. Estimates of post-mobilization training needed by SMCR (days)

Element	Field training					SORTS	Best estimate (days)
	Senior officer	SMCR survey	Annual deficit	MEU/UDP workup	Desert Storm mobilization		
GCE:							
Co	30	24	-	30	33	-	30
Bn	60-90	69	62-107	60	48-86	< 42	60-70
Regt	90-120	26	-	-	-	-	90-120
CSSE	-	30	-	-	33	< 42	30
ACE	-	-	24-27	-	-	< 42	30
SRIG	-	35	-	-	33	< 42	30
MEF	-	-	-	-	-	-	120-180

ALTERNATIVE FORCE STRUCTURES

In this section, we address a second distinct part of the study: development of alternative force structures. We designed these alternatives to reflect a range of total force that reflects historical realities and projected national needs. Within this range of total force, we developed various mixtures of active and reserve forces that differ greatly in terms of their ability to perform possible missions, expected response times, and cost.

Because the MEF is the Marine Corp's basic warfighting organization, we used the MEF and subdivisions of the MEF as the basic building blocks for the development of alternative structures. The "standard" MEF is the baseline MEF defined by the Marine Corps Force Structure Planning Group (FSPG) [10]. At its wartime table-of-organization strength, a MEF contains about 40,500 Marines.

We make the assumption that any adjustments to the size of the Marine Corps will be made in a balanced manner (i.e., that the mix of ground and aviation units will not change markedly). Currently, the Marine Corps is a versatile, balanced, and rapidly mobile force that can operate on land and sea and in the air anywhere on the globe. A force with that capability will be needed in the future. Major changes in the mix of units in the Marine Corps would jeopardize that capability. As part of this balanced force, we also assume that Marine Corps reserve forces will continue to be approximate mirror images of the active forces.

We examined alternatives within the framework of the paradigm shown in figure 4. In the figure, the vertical axis represents the number of reserve MEFs; the horizontal axis, the number of active-duty MEFs. The diagonal lines represent the total force (i.e., the sum of the active-duty and reserve MEFs). On this figure an "area of interest" can be defined that bounds the likely Marine Corps of the future. We established the bounds as follows.

First, we selected the range of total force. We set the upper bound at 4 MEFs (the upper diagonal line on figure 4). Four MEFs was the nominal total Marine Corps force structure circa 1990. A larger force does not seem to be needed or feasible. We set the lower bound on total force at 2.5 MEFs (the lower diagonal in figure 4). This was the size force that deployed to the Persian Gulf during Desert Shield/Storm. This lower limit seems to be a reasonable minimum as this size force would allow a replay of Desert Shield/Storm if all other Marine Corps operations (i.e., routine forward deployments and contingency operations) were suspended. We are not advocating that the nation draw down its "force in readiness" to a level that would preclude forward deployments and contingency operations during a major conflict. Our position is only that this minimum posture and corresponding force level represent a point below which the nation would not want to go.

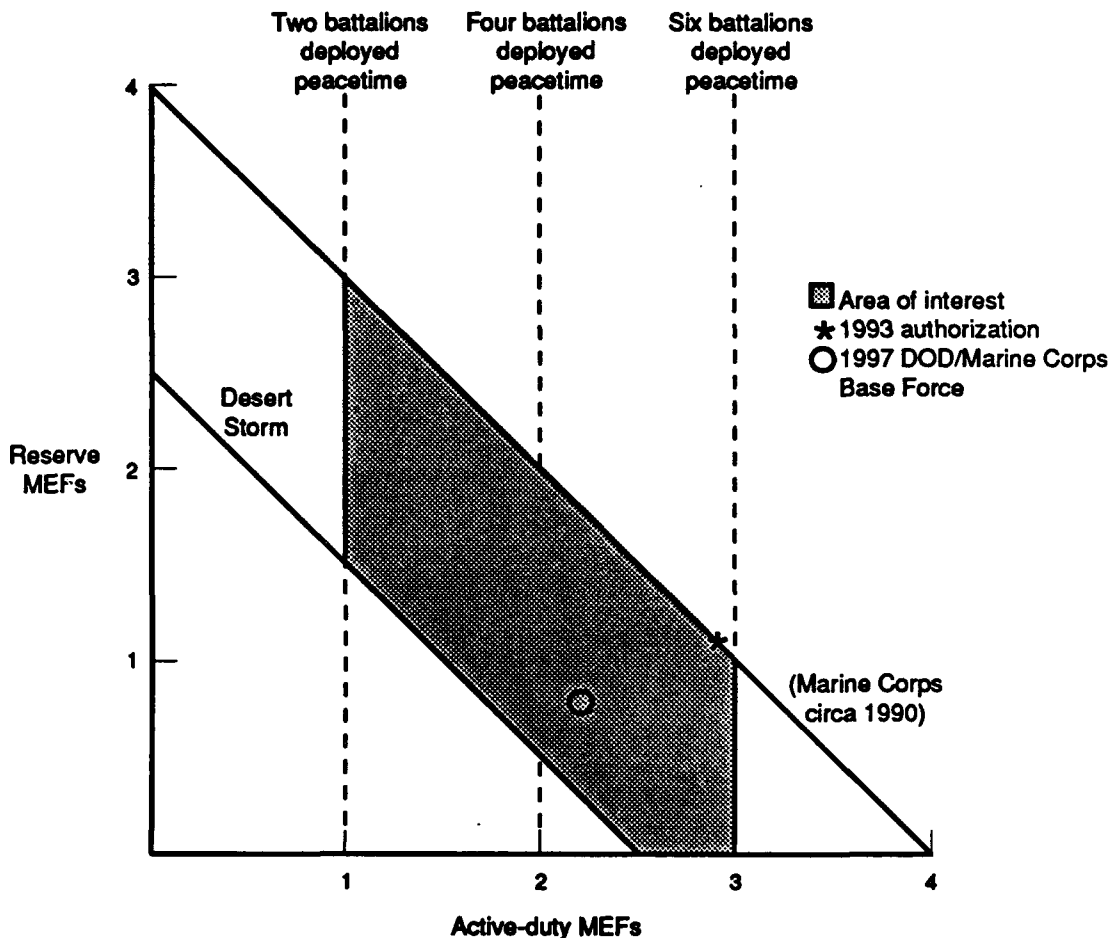


Figure 4. Marine Corps total-force structure paradigm

Second, we bounded the size of the *active* force. The size of the active force is defined by the forces that are needed to do those things that only an active force can do (i.e., quick-response scenarios and forward deployments). We set the upper bound at 3 MEFs, which was the nominal active structure circa 1990. This force level would support the rotation base for the current forward-deployment posture of six infantry battalions¹ (MEUs and UDP battalions). This choice is represented by the rightmost vertical line in figure 4. We set the lower bound of the active force at 1 MEF, the leftmost vertical line in figure 4. This size force represents what would be necessary to maintain a rotation base for two MEUs or UDP battalions. Figure 4 also shows the forces in the FY 1993 Budget Authorization [11] and the FY 1997 DOD Base Force [10].

1. In volume 4 [1], we discuss the rotation base in detail and conclude that one MEF can generally support two forward-deployed units.

We generated different alternatives within the bounded area by choosing a minimum increment in force size that would make a meaningful difference in capability. The increment chosen was 0.5 MEF, which would provide a Marine expeditionary brigade (MEB) plus an allowance for other requirements (e.g., administrative needs and the geographical separation of units--see [2]).

Applying the 0.5 MEF force increment to the paradigm yields 20 options, as shown in figure 5. The DOD 1997 Base Force (option 11) falls between the regularly spaced alternatives we generated.

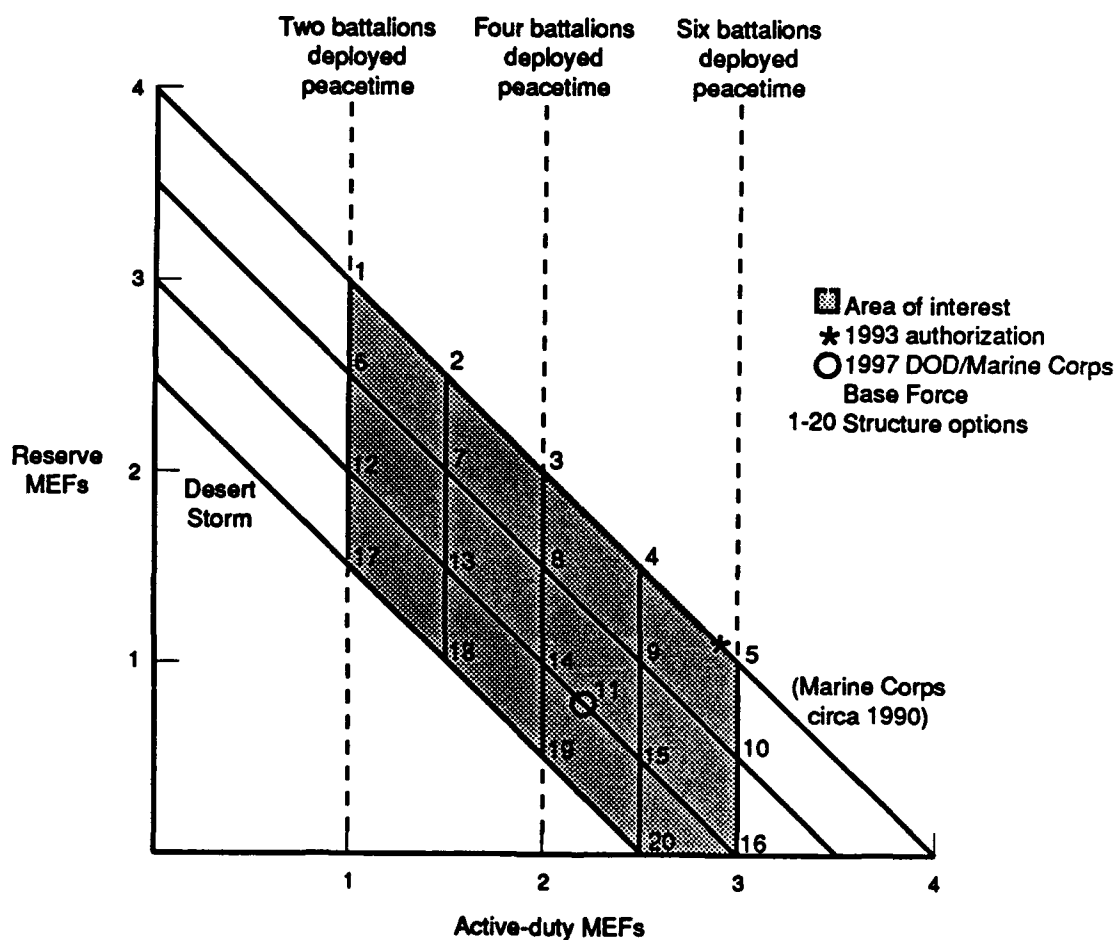


Figure 5. Marine Corps total-force structure options

These options differ widely in capability and cost. The least costly options are those with fewer active units and more reserves, which are in the lower left corner of the area of interest. The most costly options are those in the upper right corner of the area of interest. Between these extremes are options that represent fundamental tradeoffs between cost and capability. Table 11 lists the complete set of alternatives. Volume IV [2] provides a detailed analysis of their costs and capabilities.

Table 11. USMC alternative force structures

Figures reference number	Number of MEFs		
	Active / Reserve		Total
1	1.0	/ 3.0	4.0
2	1.5	/ 2.5	4.0
3	2.0	/ 2.0	4.0
4	2.5	/ 1.5	4.0
5	3.0	/ 1.0 ^a	4.0
6	1.0	/ 2.5	3.5
7	1.5	/ 2.0	3.5
8	2.0	/ 1.5	3.5
9	2.5	/ 1.0 ^a	3.5
10	3.0	/ 0.5	3.5
11	2.2 ^b	/ 0.8 ^b	3.0
12	1.0	/ 2.0	3.0
13	1.5	/ 1.5	3.0
14	2.0	/ 1.0 ^a	3.0
15	2.5	/ 0.5	3.0
16	3.0	/ 0.0	3.0
17	1.0	/ 1.5	2.5
18	1.5	/ 1.0 ^a	2.5
19	2.0	/ 0.5	2.5
20	2.5	/ 0.0	2.5

a. FY 1993 Reserve Authorization.

b. DOD FY 1997 Base Force.

REFERENCES

- [1] CNA Research Memorandum 92-182, *USMC Active and Reserve Force Structure and Mix Study, Volume I: Summary*, by H. Dwight Lyons, Jr., William H. Sims, and John D. Goetke, Dec 1992
- [2] CNA Research Memorandum 92-161, *USMC Active and Reserve Force Structure and Mix Study, Volume IV: Analysis of Alternative Force Structures and Mixes*, by H. Dwight Lyons, Jr., and John D. Goetke, Dec 1992
- [3] U.S. Government Printing Office, *Title 10, U.S. Code*
- [4] Department of Defense, Directorate for Information, Operations, and Reports, *Selected Manpower Statistics*, recurring series
- [5] Marine Corps Combat Development Center (Code TE-31) 1992
- [6] Joint Chiefs of Staff, Joint Pub 1-03.3, *Joint Reporting Structure, Status of Resources and Training System (SORTS)*, Oct 1990
- [7] CNA Research Memorandum 92-180, *USMC Active and Reserve Force Structure and Mix Study, Volume V: Scenarios and SORTS Data (U)*, by H. Dwight Lyons, Jr., and William H. Sims, Secret, Dec 1992
- [8] Commanding General, Marine Reserve Forces, March 1992
- [9] Headquarters, Marine Corps, Office of Deputy Chief of Staff, Manpower and Reserve Affairs, Aug 1992
- [10] Headquarters, U.S. Marine Corps, *USMC 2001--A Concept for the Employment of Marine Corps Total Force in Joint Operations into the 21st Century*, 1991
- [11] U.S. Congress, Report 102-311, *National Defense Authorization Act for FY 92 and 93, Conference Report*, 13 Nov 1991

APPENDIX A
HISTORICAL DATA

APPENDIX A
HISTORICAL DATA

The historical data on Marine Corps active-duty and reserve strength were taken from [A-1] and are tabulated in tables A-1 through A-3.

Table A-1. USMC active and reserve strength^a:
1940-1990

Year	Active duty	Reserves not on active duty	Total
1940	28,345		
1941	54,359		
1942	142,613		
1943	308,523		
1944	475,604		
1945	469,925		
1946	155,679	22,807	178,732
1947	93,053	45,536	138,589
1948	84,988	111,122	196,110
1949	85,965	123,817	209,782
1950	74,279	128,962	203,118
1951	192,620	40,367	232,987
1952	231,967	81,435	313,402
1953	249,219	78,455	327,674
1954	223,868	138,846	362,714
1955	205,170	185,677	390,847
1956	200,780	229,641	430,421
1957	200,861	270,300	471,161
1958	189,495	301,376	490,871
1959	175,571	315,930	491,501
1960	170,621	258,477	429,098
1961	176,909	242,691	419,600
1962	190,962	177,581	368,543
1963	189,683	134,336	324,019
1964	189,777	136,001	325,778
1965	190,213	134,002	324,215
1966	261,716	148,977	410,693
1967	285,269	144,288	429,557
1968	307,252	167,910	475,162
1969	309,771	202,578	512,349
1970	259,737	234,418	494,155

Table A-1. (Continued)

Year	Active duty	Reserves not on active duty	Total
1971	212,369	270,657	483,026
1972	198,238	246,193	444,431
1973	196,098	221,100	417,198
1974	188,802	182,872	371,674
1975	195,951	133,728	329,679
1976	192,399	116,210	308,609
1977	191,707	108,843	300,550
1978	190,815	97,531	288,346
1979	185,250	100,378	285,628
1980	188,469	102,370	290,839
1981	190,620	98,812	289,432
1982	192,380	93,967	286,347
1983	194,089		
1984	196,214	100,100	296,214
1985	198,025		
1986	198,814		
1987	199,525		
1988	197,350	87,400	284,750
1989	196,956		
1990	196,652	82,200	278,852

a. Department of Defense, Directorate for
Information, Operations, and Reports,
Selected Manpower Statistics FY 1990.

Table A-2. USMC reserves: 1946-1990

Year	Active duty ^a	Not on active duty ^b	Total
1946	53,039	22,807	75,846
1947	2,507	45,536	48,043
1948	1,623	111,122	112,745
1949	1,694	123,817	125,511
1950	2,398	128,962	131,237
1951	82,381	40,367	122,748
1952	19,347	81,435	100,782
1953	19,165	78,455	97,620
1954	29,019	138,846	167,865
1955	24,974	185,677	210,651
1956	22,816	229,641	252,457
1957	40,356	270,300	310,656
1958	31,295	301,376	332,671
1959	12,360	315,930	328,290
1960	8,369	258,477	266,846
1961	7,275	242,691	249,966
1962	9,016	177,581	186,597
1963	8,211	134,336	142,547
1964	7,344	136,001	143,345
1965	6,923	134,002	140,925
1966	18,026	148,977	167,003
1967	20,090	144,288	164,378
1968	12,424	167,910	180,334
1969	12,899	202,578	215,477
1970	11,618	234,418	246,036
1971	9,343	270,657	280,000
1972	7,695	246,193	253,888
1973	8,199	221,100	229,299
1974	8,234	182,872	191,106
1975	7,908	133,728	141,636
1976	7,082	116,210	123,292
1977	6,223	108,843	115,066
1978	5,548	97,531	103,079
1979	5,060	100,378	105,438
1980	5,152	102,370	107,522
1981	5,302	98,812	104,114
1982	5,842	93,967	99,809
1983			
1984	6,500	100,100	106,600
1985			
1986			
1987			
1988	4,500	87,400	91,900
1989			
1990	4,600	82,200	86,800

a. Excludes reserves on active duty for training purposes.

b. Includes reserves on active duty for reserve training.

**Table A-3. USMC ready reserves:
1958-1990**

Year	IRR	SMCR ^a	Ready ^b
1958	171,733	44,428	216,161
1959	165,074	44,218	209,292
1960	166,572	42,825	209,397
1961	151,445	41,776	193,221
1962	87,664	43,248	130,912
1963	50,265	45,529	95,794
1964	57,697	44,539	102,236
1965	51,844	47,769	99,613
1966	47,937	48,726	96,663
1967	60,306	49,442	109,748
1968	89,893	43,968	133,861
1969	126,083	48,105	174,188
1970	144,569	48,576	193,145
1971	144,036	42,943	186,979
1972	130,448	39,782	170,230
1973	100,615	33,124	133,739
1974	62,210	32,899	95,109
1975	57,582	31,129	88,711
1976	54,771	29,306	84,077
1977	45,277	30,951	76,228
1978	39,614	32,695	72,309
1979	59,207	33,290	92,497
1980	56,592	35,662	92,254
1981	51,411	37,304	88,715
1982	44,574	40,461	85,035
1983	46,537	42,690	89,227
1984	48,429	40,619	89,048
1985	47,855	41,586	89,441
1986	49,340	41,582	90,922
1987	44,580	42,253	86,833
1988	42,389	43,556	85,945
1989	36,552	43,576	80,128
1990	36,825	44,530	81,355

a. Includes reserves on IADT, does not include personnel paid only for ADT (15 days).

b. Individual Ready Reserve (IRR) + SMCR.

REFERENCE

- [A-1] Department of Defense, Directorate for Information, Operations, and Reports, *Selected Manpower Statistics*, recurring series

APPENDIX B
CAREER FIELD-TRAINING DAYS

APPENDIX B

CAREER FIELD-TRAINING DAYS

In this appendix, we draw a comparison between the career experience level of a group of active-duty Marines beginning a workup for deployment and that of the SMCR.

Field-training days are chosen as the measure of experience because we consider them to be of more importance than classroom training days and because the data are routinely recorded. Each battalion reports its annual field training in terms of the number of battalion field-training days (BFTD). These data represent the number of days per year that the entire battalion (or equivalent) was engaged in training away from the garrison. Because the entire battalion will not always be in the field at the same time, partial credit is given as appropriate. For example, one-third of a battalion in the field for three days counts as one BFTD.

Table B-1 shows the recent average annual BFTD for active and SMCR ground combat units. We chose a pre-Desert Storm time frame because normal training schedules were distorted by the conflict. The BFTD reported by active units range from 90 for the amphibious assault vehicle (AAV) battalion to 133 for the infantry and tank units. The BFTD reported by the SMCR range from 28 days by the AAV and Engineer battalions to 38 for the reconnaissance units. For this report, we use the infantry data of 133 days for active units and 32 days for SMCR units.

Table B-1. Comparison of annual battalion field-training days: Active and SMCR ground combat units

Type of unit	Average annual BFTDs ^a		
	Active ^b	Reserve	Reserve deficit
Infantry	133	32	101
Tanks	133	26	107
AAV	90	28	62
Artillery	104	37	67
Engineer	111	28	83
Reconnaissance	104	38	66
Light armored vehicle	<u>126</u>	<u>41</u>	<u>85</u>
Average	114	33	82

a. MCTEC (Code TE-33).

b. Actual time for FYs 1987, 1988, and 1989.

c. Actual time for FYs 1987 and 1989.

Table B-2 shows the composition of the SMCR by prior-service status. We present the data by years of SMCR service. Years of service are expressed as truncated integers; (e.g., 873 prior-service Marines have at least one but less than two years of SMCR service). About 40 percent of the personnel have prior service. Of those with prior service, about half have prior active-duty service. The remainder have prior reserve service.

Table B-2. Time in SMCR by prior-service status

Time in SMCR (years)	Number of personnel ^a		
	Prior service ^b	Non-prior service	Total
< 1	1,452	4,112	5,564
1	873	5,719	6,592
2	2,021	4,613	6,634
3	2,355	3,204	5,559
4	2,297	3,094	5,391
5	1,965	2,536	4,501
6	1,405	1,075	2,480
7	765	201 ^c	966
8	644		644
9	579		579
10	471		471
11	533		533
12	406		406
13	350		350
14	321		321
15	292		292
16	205		205
17	208		208
18	104		104
19	83		83
20	47		47
> 20	199		199
Total	17,575	24,554	42,129
Average years	6.2	2.8	
Median years	4.4	2.0	

a. As of August 1992, less 2.5 percent with missing data.

b. DC/S M&RA indicates that about 50 percent of these personnel have prior active service.

c. Includes 31 individuals with calculated time in SMCR > 7 years

Using the data in tables B-1 and B-2, we can estimate the career field-training experience of Marines in the SMCR. These estimates are shown in table B-3. In the table, we show the BFTD of prior-service Marines separately for their active service and their reserve service. Individuals with prior active-duty service have not been individually identified but are believed to be primarily those with the least service time in the SMCR. Accordingly, we have associated a total of 466 BFTD with that half of the prior-service reservists. This calculation assumes 3.5 years of active duty at 133 BFTD per year (typical four-year enlistment less six months of initial training) during their period of active service. The BFTD that these prior-service Marines have accumulated during their years in the SMCR are shown in a separate column and are assumed to accumulate at the rate of 32 BFTD per year. The BFTD estimates for the Marines with no prior service assume an accumulation of 32 BFTD per year beginning after the first six months of initial training.

Table B-4 organizes the data from table B-3 by BFTD. For example, the least-experienced 71 percent of Marines in the SMCR have a career total of 304 or less BFTD.

Table B-5 gives similar data for the cumulative training experience of active-duty units. We identified four representative MEU and UDP units that started their predeployment workup circa 1988. The table gives a distribution in cumulative percent of unit by time in service, and the average for these four units. For example, about 75 percent of the personnel in the units have at least two but less than three years of service. In the last column of table B-5, we have associated with each year group an estimate of their career BFTD. The BFTD were estimated at the rate of 133 days per year, excluding the first six months of training. For example, the least experienced 75 percent of these Marines have 266 or fewer career BFTD.

In figure B-1, we compare the cumulative experience, expressed in BFTD, of Marines in the SMCR and active-duty units beginning pre-deployment workup. The two distributions are very similar. Thus, the experience level of SMCR units may be approximated by that of active units just beginning predeployment workup.

Table B-3. Estimated field-training experience by time in SMCR

Time in SMCR (years)	Prior service				Non-prior service	
	BFTD by source				Number	BFTD in SMCR
	Number	Active duty	SMCR	Total		
< 1	1,452	466 ^a	16 ^b	482	4,112	0 ^c
1	873	466	48	514	5,719	32
2	2,021	466	80	546	4,613	64
3	2,355	466	112	578	3,204	96
4	2,297	466	144	610	3,094	128
5	1,965	0	176	176	2,536	160
6	1,405	0	208	208	1,075	192
7	765	0	240	240	201 ^b	224
8	644	0	272	272		
9	579	0	304	304		
10	471	0	336	336		
11	533	0	368	368		
12	406	0	400	400		
13	350	0	432	432		
14	321	0	464	464		
15	292	0	496	496		
16	205	0	528	528		
17	208	0	560	560		
18	104	0	592	592		
19	83	0	629	629		
20	47	0	656	656		
> 20	199	0	688	688		
Total	17,575				24,554	

a. Assumes 3.5 years of active duty at 133 BFTD per year (typical four-year term less six months of initial training). HQMC, DC/S Manpower and Reserve Affairs, estimates that 50 percent of prior-service SMCRs have prior active-duty service. In this analysis, these persons are not individually identified but are assumed to be primarily those prior-service persons with the least time in the SMCR.

b. Assumes 32 days of BFTD per year in SMCR.

c. After first six months of boot camp and initial training.

Table B-4. Estimated cumulative field-training experience of SMCR

Career BFTD	Number	Cumulative number	Cumulative percentage
0	4,112	4,112	9.8
32	5,719	9,831	23.3
64	4,613	14,444	34.3
96	3,204	17,648	41.9
128	3,094	20,742	49.2
160	2,536	23,278	55.3
176	1,965	25,243	60.4
192	1,075	26,318	62.5
208	1,405	27,723	65.8
224	201	27,924	66.3
240	765	28,689	68.1
272	644	29,333	69.6
304	579	29,912	71.0
336	471	30,383	72.1
368	533	30,916	73.4
400	406	31,322	74.4
432	350	31,672	75.2
464	321	31,998	75.9
482	1,452	33,445	79.4
496	292	33,737	80.1
514	873	34,610	82.2
528	205	34,815	82.6
546	2,021	36,836	87.4
560	208	37,044	87.9
578	2,355	39,399	93.5
592	104	39,503	93.8
610	2,297	41,800	99.2
629	83	41,883	99.4
656	47	41,930	99.5
688	199	42,129	100.0

Table B-5. Estimated cumulative field-training experience of active-duty battalions before predeployment workup

Time in service (years)	Cumulative percentage of unit					Estimated ^a career BFTD
	Unit A	Unit B	Unit C	Unit D	Mean	
< 1	27.8	16.1	23.8	20.4	22.0	0
1	43.3	32.5	44.6	42.7	40.8	133
2	74.4	72.4	76.4	77.9	75.3	266
3	80.0	78.2	81.9	81.7	80.5	399
4	83.0	82.4	85.6	85.2	84.1	532
5	86.9	84.5	88.0	87.9	86.8	665
6	88.8	87.3	89.6	89.8	88.9	798
7	91.2	89.5	90.8	91.3	90.7	931
8	93.5	92.0	92.7	92.3	92.6	1,064
9	95.1	93.5	93.7	93.7	94.0	1,197
10	95.8	94.0	94.5	94.9	94.8	1,330
11	96.5	94.8	94.9	96.1	95.5	1,463
12	97.6	95.8	96.3	96.9	96.7	1,596
13	97.7	96.9	97.0	97.1	97.2	1,729
14	97.8	97.6	97.6	97.7	97.7	1,862
15	98.4	98.4	98.3	98.3	98.4	1,995
16	98.4	98.9	98.7	98.8	98.7	2,128
17	99.1	99.5	98.9	99.1	99.2	2,261
18	99.4	99.5	99.2	99.5	99.4	2,394
19	99.6	99.9	99.3	99.6	99.6	2,527
20	99.7	99.9	99.6	99.7	99.7	2,660
> 20	100.0	100.0	100.0	100.0	100.0	2,793

a. Estimated at a rate of 133 BFTD per year, excluding the first six months of initial training.

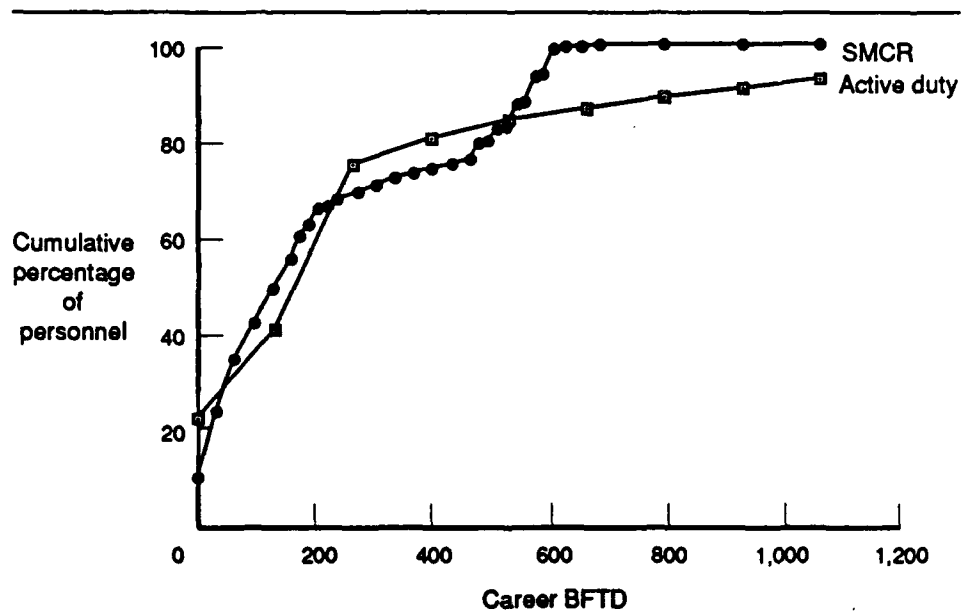


Figure B-1. Comparison of post-recruit-training career BFTD for SMCR and active-duty units beginning pre-deployment workup